# Bathymetry and Selected Perspective Views of Selected Lake Trout Spawning Areas in Northern Lake Michigan

Open File Report 03-120
SHEET 2 of 2

Peter Barnes, Guy Fleischer, James Gardner and Kristen Lee
US Geological Survey

Universal Traverse Mercator projection, Zone 16, WGS 84 ellipsoid
Illumination 315∞; elevation 45∞
Vertical Exaggeration 10x
Viewable with ChromaDepth 3D glasses

Land image generated from USGS 30-m DEM
Lake floor image generated from LIDAR elevation data below 178.80m (ref. IGLD 85)
Lake floor image generated from Regional NOAA-GLERL bathymetry and SHOALS bathymetry.
Data aquired on a four meter grid in August were collected and processed by J.E. Chance under contract to the Army Corp of Engineers and the U.S. Geological Survey.

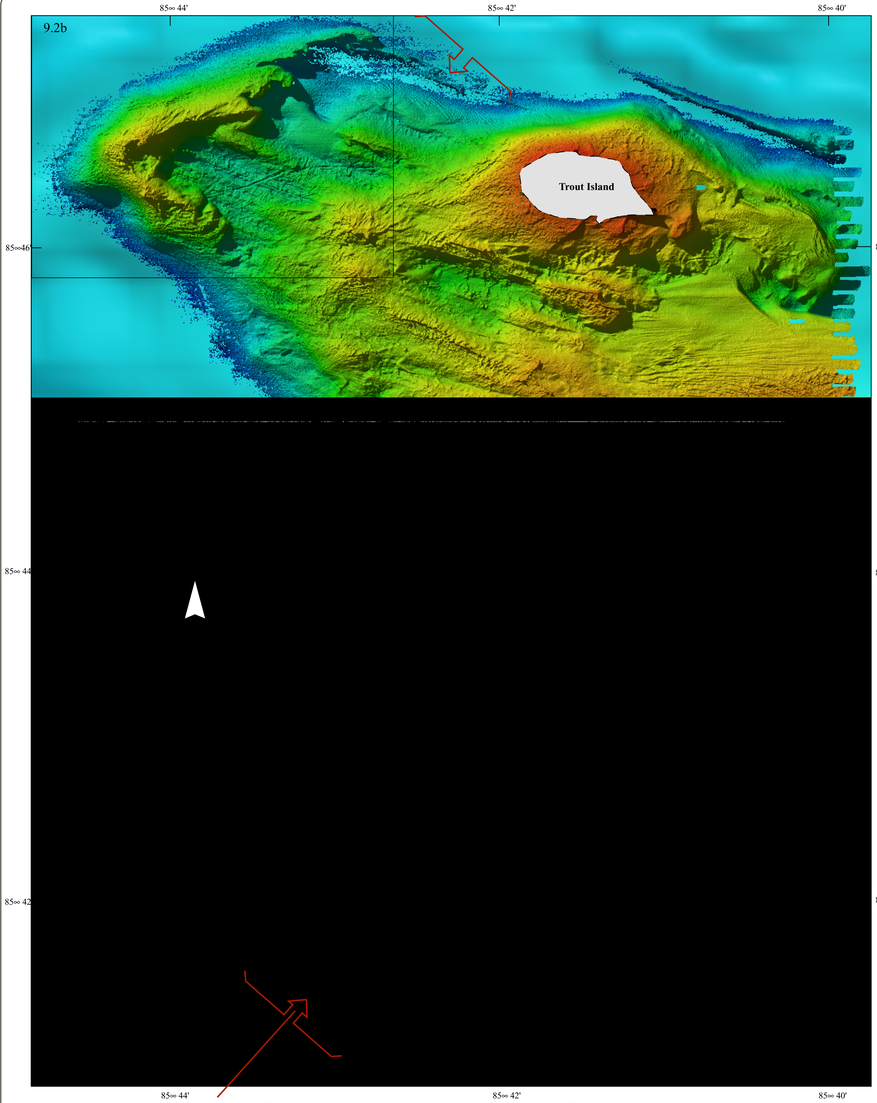



Figure 5.1 - Shaded relief map of Trout Island Shoal (upper left), Trout Island area, and west coast of High Island. The rough nearshore relief west of High Island (bedding in the Devonian Bois Blanc Formation?) transitions abruptly offshore to a smooth depositional substrate (sand?). North of High Island the east-west linear trends similar to those seen on Boulder Reef underlie sediment drapes (sand?). The linear and box work texture is similar to that seen in Boulder and Gull Island reefs (Figures 2 and 3) The morphology of Trout Island Shoal suggests a large sand shoal migrating eastward over underlying units of the Devonian Bois Blanc Formation (Fig.1) or glacial deposits. Two or three gouges unknown origin (ice?, manmade?) extend east of the shore for over 1 km. The slopes of the Shoal are relatively steep, especailly on the the eastern edge. Figures 9.2a and 9.2b are located in the map text.

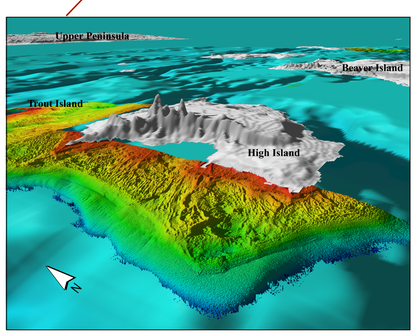



Figure 5.2 - Oblique perspective looking northeast along the west coast of High Island. The rough morphology nearshore (glacial or Bois Blanc Formation) is similar in texture and trend to Gull Island reef (Figure 3.1).This relief abruptly changes to a smooth (sand?) bottom along a 2-3m scarp at about 10 m water depth the bottom of this scarp may represent the location of a previous (glacial?) shoreline. This sharp transition and shoreline-like? feature is not obvious at other mapped sites. Distance across the foreground of this perspective is 5.0 km.

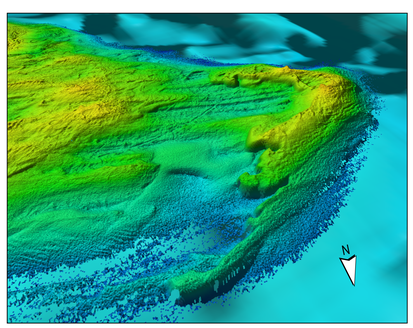



Figure 5.3 - Oblique perspective looking southeast (from upper right of figure 5.1) at Trout Island Shoal with 3 generations of recurved spits in the right foreground. Pronounced northwest-southeast linear ridges (glacial?) partly obscured by recent patches of smooth sand(?) occur east (left in this figure) of the shoal. Distance across the foreground of this perspective is 3.0 km.

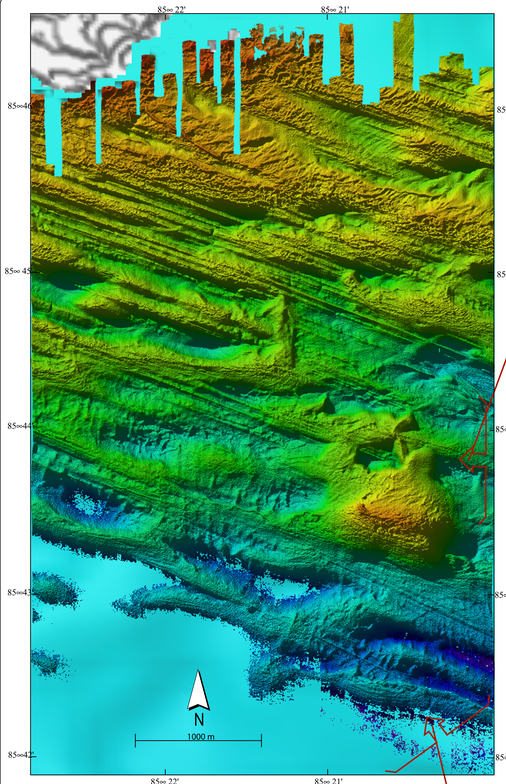



Figure 6.1 - Shaded relief map of area southeast of Hog Island including Hog Island Reef (shoal at lower right). This mapped area is marked by strong northwest-southeast ridges and lineations about a meter high and a few meters wide. These lineations are more pronounced but have a similar orientation to those to the west in the Trout Island map(Fig.5.1). An indistinct northeast southwest lineation is also present, especially in the northeastern quadrant of the image (Fig.6.3). Draped over this morphology are patches of smoother relief (sand?) which forms north-south bedforms. Hog Island reef itself does not seem to have obvious relation to either morphologic feature. Underwater observations (Somers, 1968) report flat lying outcrops of limestone at Hog Island Reef.

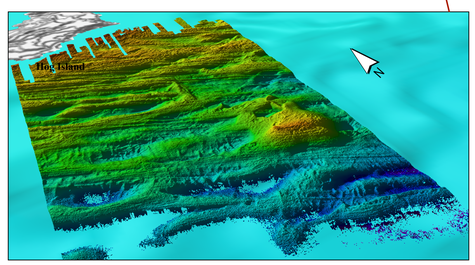



Figure 6.2 - Oblique perspective looking northeast at Hog Island Reef area. North-south bedforms are associated with patches of sand(?) alligned east-west. The fine and linearly continous morphology of glacial or bedrock outcrop underlys both the bedform and sand patches. Distance across the foreground of this perspective is 4.7 km.

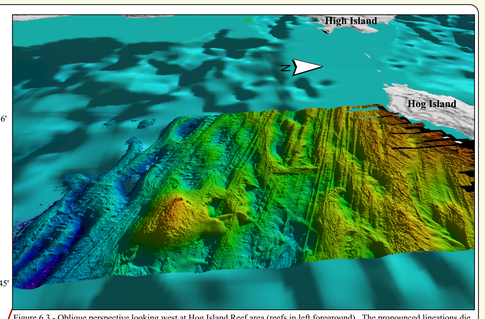



Figure 6.3 - Oblique perspective looking west at Hog Island Reef area (reefs in left foreground). The pronounced lineations die out to the right and appear buried by a coarse morphology that looks similar to the boulder and cobble areas seen at Boulder and Gull Island Reefs. Distance across the foreground of this perspective is 6.7 km.

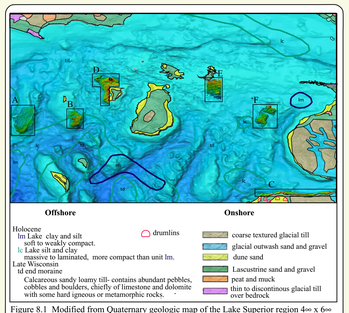



Figure 8.1 Modified from Quaternary geologic map of the Lake Superior region 4∞ x 6∞ Quadrangle, United State and Canada, showing areas mapped with high resolution LIDAR morphology and onshore topographly,1984 and 1982 Quaternary Geology Michigan Natural Features Inventory and MI DNR.

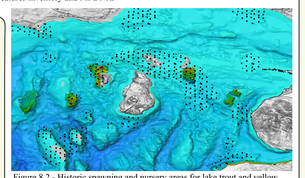


Figure 8.2 - Historic spawning and nursery areas for lake trout and yellow perch (modified after Goodyear et al., 1982).

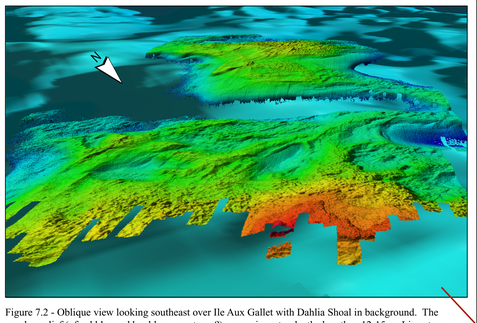
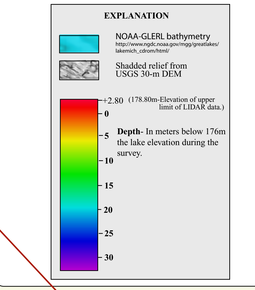



Figure 7.2 - Oblique view looking southeast over Ile Aux Gallet with Dahlia Shoal in background. The rougher relief (of cobbles and boulders or outcrop?) occurs in water depths less than 12-15m. Limestone outcrops are reported from Ile Aux Gallet underwater observations (Somers, 1968). In deeper water patches and re-entrants of smoother morphology indicate depositional sites (sand?). Distance across the bottom of image is about 2.1 km.



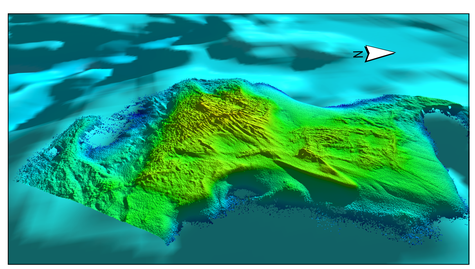



Figure 7.3- Oblique Perpective of Dahlia Shoal looking west (from right side of Figure 7.1). Two lobe like troughs at the left and shallow portion of the reef terminate eastward in rough relief and meter-high ridges similar to Boulder and Gull Island Reefs (Fig. 2 and 3). Sediment sand drapes the deeper slopes to the south and east, but less so to the west and south suggesting sediment transport from those directions. Distance across the bottom of perpective is about 3.9 km.

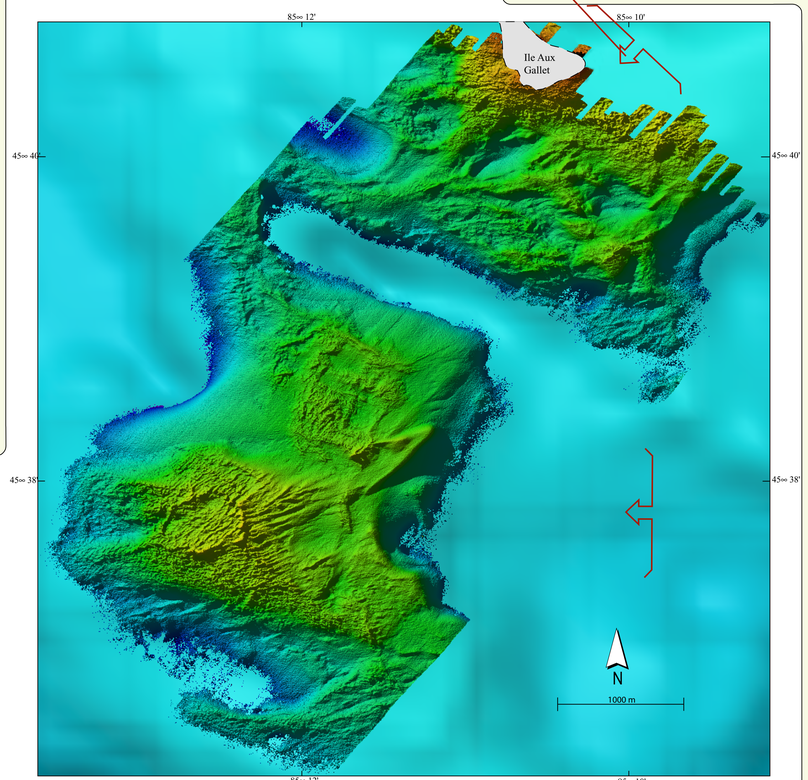



Figure 7.1- Shaded relief map of Dahlia shoal and southwest side of Ile aux Galets. The outline of the image is marked by numerous smooth ampitheater-like features opening to the southwest and northwest. Their original origin is unknown but at present they appear to be in filling with sediment. The Dahlia shoal portion of the area southwest of the 500 m wide linear trough has rough relief, an arcuate ridge, and radiating ridges to the northest similar to those seen at Gull Island Reef. This area is underlain by carbonates of the Detroit River Group (Mich. DNR).